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MIL-E-16400	Electronic, Interior Communication and Navigational Equipment - Naval Ship and Shore
MIL-E-17555	Electronic and Electrical Equipment Accessories and Repair Parts; Packaging and Packing of
MIL-H-46855	Human Engineering Requirements for Military Systems, Equipment and Facilities

2.2.1 Military Standards.--

MIL-STD-108	Definition of and Basic Requirements For Enclosure For Electric and Electronic Equipment
MIL-STD-109	Quality Assurance Terms and Definitions
MIL-STD-280	Definitions of Item Levels, Item Exchangeability, Models, and Related Terms
MIL-STD-2911	Standard Tactical Air Navigation (TACAN) Signal
MIL-STD-4115	Test Provisions for Electronic Systems and Associated Equipment, Design Criteria for
MIL-STD-461	Electromagnetic Interference Characteristics, Requirements for Equipment
MIL-STD-462	Electromagnetic Interference Characteristics, Measurement of
MIL-STD-470	Maintainability Program Requirements
MIL-STD-4711	Maintainability Demonstration
MIL-STD-472	Maintainability Prediction
MIL-STD-7211	Definition of Effectiveness Terms for Reliability, Maintainability, Human Factors and Safety
MIL-STD-7811	Reliability Testing for Engineering Development
MIL-STD-785	Reliability Program for Systems and Equipment Development and Production
MIL-STD-810	Environmental Test Methods
MIL-STD-1388-2	DOD Requirements for a Logistics Support Analysis Record
MIL-STD-15211	Technical Review Audits for Systems Equipments and Computer Programs
DOD-STD-2167	Defense System Software Development

2.3 Other Documents.--

FAA 1800.8	National Airspace and Configuration Management
FAA 9840.11	U.S. National Aviation Standard for VOR/DME/TACAN Systems
MIL-HDBK-2117	Reliability Stress and Failure Rate Data for Electronic Equipment
TI 6820.2	Instruction Book VORTAC, VOR/DME, VOR Equipment

Single copies of military standards and specifications may be requested by mail or telephone from the U.S. Naval Supply Depot, **5801 Tabor** Avenue, Philadelphia, Pennsylvania **19120**. For telephone requests call **(215) 697-3321**, 8 am to **4:30** pm, (Philadelphia time) Monday through Friday. Not more than five items may be ordered on the same request. The applicable invitation for bids or contract number should be cited.

3. REQUIREMENTS.

3.1 System Definition.— The **Tacan** antenna system described herein shall utilize a vertically polarized antenna capable of transmitting radio frequency (RF) energy in the **962** MHz to **1213** MHz frequency band. It shall provide a **15 Hz/135** Hz composite signal, north and auxiliary ~~triggers~~, and a **1350** Hz synchronized signal which may be generated as **an** integral part of the radiating antenna function or from a distinct and separate unit. Should a separate signal generating unit design be chosen, the signal generating unit shall be capable of operating in accordance with this specification and with interconnecting cables to the antenna being up to **500** feet maximum length.

3.1.1. Antenna Definitions.— The subparagraphs hereto define terminology used in and applicable to equipment furnished under this specification.

3.1.1.1 Antenna Gain. The gain of the antenna at a point in space is defined as the ratio of the power density (watts/square/meter) observed at a great distance (free space pattern) to the power density at the angular coordinates defining that point (azimuth and elevation) when a given amount of RF power is applied to the input terminals of a matched ~~lossless~~ isotropic radiator, such ratio to be expressed in terms of **db.** Gain as defined herein includes the radiation efficiency of the antenna.

3.1.1.2 Major Lobe Center. The position of the center lobe is defined as the point midway between the measured half power points above and below the maximum intensity of the lobe.

3.1.1.3 Angle of Elevation. The acute angle formed between the horizontal plane containing the radiating elements and any line intersecting that plane at the radiating element.

3.1.1.4 Reserved.

3.1.1.5 Line Replaceable Unit (LRU). An **LRU** consists of one or more electronic/mechanical ~~subassemblies~~ and assemblies, as defined in **MIL-STD-280** and applicable part of **MIL-STD-1388-2**, and excludes items falling under the definition for a part as given in **MIL-STD-280**. For example, the resistors, capacitors, and individual **ICs** on a circuit board would be listed as parts. The circuit boards themselves including all mounted parts, would be subassemblies, and as such would be **LRUs**. In turn, these subassemblies could be combined to form an assembly. With respect to fault isolation, the term **LRU** refers to the lowest subassembly that still retains the identity of an **LRU** as defined above.

3.1.1.6 Beacon.— The electronics that are connected to the antenna. This includes the transmitter and the receiver: The beacon equipment is also referred to as the transponder.

3.1.2 System Block Diagram.— Figure 1 is an outline of the **Tacan** Antenna System Functional Block Diagram.

3.2 Characteristics.— The antenna system shall operate in conjunction with the **FA-9996 (FAA-E-2678) Tacan** ground station equipment to provide navigation information (azimuth and distance) to aircraft. The antenna system shall be capable of operating in the **962 to 1213** MHz frequency band.

Azimuth information is determined from time measurement between the sine wave generated by the antenna rotating field (**15** Hz and **135** Hz) and the reference burst pulses. Additionally, the antenna shall provide a **1350** Hz identification signal for the **TACAN** system.

The antenna system shall incorporate integral monitoring which shall provide a fault signal to the **FA-9996 (FAA-E-2678) Tacan** equipment when a fault in the **TACAN** antenna system exists. The fault signal shall be either an alert signal or a **TACAN** beacon shutdown signal, determined by whether or not the antenna system fault would cause an erroneous navigational signal to be transmitted.

The operation of the **Tacan** antenna system from the battery power source or commercial power shall not cause any degradation of the **FA-9996** system.

3.2.1 Performance Characteristics.— The antenna system shall operate with the **FA-9996 TACAN** system and shall provide ground based **TACAN** service to airborne aircraft as specified in **MIL-STD-2911**. The antenna system shall provide the following functions:

a. Trigger pulses which initiate the generation of north and auxiliary reference burst pulse groups in the **FA-9996 TACAN** equipment.

b. Form the **15** Hz and **135** Hz components of the **TACAN** transponder pulse train, which in conjunction with the reference burst pulse groups provides the coarse (**15** Hz) and fine (**135** Hz) azimuth information signals.

c. Establish a vertical radiation pattern which provides the coverage requirements described herein.

d. A **1350** Hz signal maintained in a constant phase relationship with respect to the reference bursts and antenna modulation patterns.

3.2.1.1 Band of Operation.— The operating frequency band shall extend from **962** to **1213** MHz and the antenna shall have the capability of operating in the **X-** and **Y-** channels specified in **MIL-STD-2911**.

3.2.1.2 Polarization.— The antenna system shall be capable of radiating and receiving vertically polarized signals. The effect of

the horizon shall be greater than a level which is **30 dB** below the power gain at the peak of the major lobe above the horizon.

3.2.1.7 Azimuth. Azimuth information is provided by the use of two signals, a variable signal used to determine the relative position of the aircraft to the **Tacan** antenna and a reference signal used to establish a basis for phase comparison of the two signals. The phase difference between the reference signal and variable signal represents the direction of the aircraft as measured from magnetic north.

3.2.1.8 Azimuth Variable Signal. The azimuth information is produced by a rotating field pattern that rotates in a clockwise direction as viewed from above and rotates at a rate of **15 Hz +0.05%**. The rotation shall produce a variable signal, nominally composed of **15 Hz** and **135 Hz** sine wave components, and shall vary from these nominal values in synchronization with the rotation rate.

3.2.1.9 Modulation. The antenna system shall amplitude modulate the **rf** carrier, in the absence of harmonics, according to the following formula :

$$Y = 1.0 + A \sin((2\pi ft + \theta)) + B \sin((18\pi ft + 0 - \phi))$$

where :

A = percent of modulation of the **15 Hz** component

B = percent of modulation of the **135 Hz** component

θ = phase difference in degrees from the **15 hz** modulation signal and the main reference pulse.

ϕ = phase difference in degrees from the **135 Hz** modulation signal and the **auxillary** or **40** degrees pulse.

y = bearing to the antenna from the point of observation.

f = pattern rotation rate in Hz.

t = time in seconds.

The sum of **A+B** shall not be greater than **0.55**. The cross polarization effects up to plus or minus **45** degrees from the vertical and within elevation angles from zero to **45** degrees, shall be limited such that θ does not exceed 2 degrees and ϕ does not exceed 1 degree.

3.2.1.10 Harmonic Content. When measured at an elevation angle of zero to six degrees, the root-sum-square (**RSS**) value of the second and third harmonics of the **15** Hz component of the radiated signal shall not exceed **15** percent of the **15** Hz component. The **RSS** value of the second and third harmonics of the **135** Hz component shall not exceed **10** percent and the **RSS** value of the **105, 120, 150, and 165** Hz intermodulation products shall not exceed **10** percent of the **15** Hz component. No individual harmonics shall exceed **10** percent of the **15** Hz component.

3.2.1.111 Reference Bearing Signals. Reference trigger pulses shall be generated by the **TACAN** antenna and provided to the transponder equipment for the purpose of establishing a reference burst for azimuth measurement.

There shall be two separate synchronized outputs of reference trigger pulses, the north trigger pulse and the auxiliary trigger pulse. The north triggers and auxiliary triggers shall be synchronized with the antenna pattern rotation. For each **360** degrees rotation, one north trigger pulse shall be generated. Forty degrees after the north trigger pulse, an auxiliary trigger pulse shall be generated at each of eight consecutive angular increments of **40** degrees ~~+0.011~~ degree. The ninth **40** degree increment auxiliary trigger pulse, which would otherwise coincide in time with the north trigger pulse, shall not be generated. The reference bearing signal shall meet the requirements of **FAA-9840.11** for the, "Ground Component Range Accuracy, Code Identification Signal Characteristics, Reference, bearing Signal, Relationship of Reference and Bearing Signals, Accuracy and Course Deviation Sensitivity."

3.2.1.111.1 Pulse Shape. Each reference trigger pulse shall occur as a positive half cycle excursion followed by a negative half cycle excursion.

3.2.1.11.2 Pulse Width. Each half cycle excursion shall be between **90** microseconds and **100** microseconds in width.

3.2.1.11.3 Pulse Amplitude. The amplitude shall be continuously adjustable over the range of **10** volts to **20** volts peak to peak. The amplitude of the negative half cycle excursion shall be within **10%** of the amplitude of the positive half cycle excursion. The amplitude shall be measured at the output connector with a load connected (see **3.2.1.111.5**).

The amplitude of the pulse stream shall not vary by more than **5%** of total pulse amplitude from the smallest to the largest pulse. In no case shall the peak value of extraneous voltages exceed **0.20** volts peak to peak as measured at the output terminals and connected to a load.

3.2.1.11.4 Pulse Timing. The time reference of the pulse shall be established at the zero crossover point from the positive half cycle excursion to the negative half cycle excursion.

3.2.1.10 Harmonic Content. When measured at an elevation angle of zero to six degrees, the root-sum-square (**RSS**) value of the second and third harmonics of the **15** Hz component of the radiated signal shall not exceed **15** percent of the **15** Hz component. The **RSS** value of the second and third harmonics of the **135** Hz component shall not exceed **10** percent and the **RSS** value of the **105, 120, 150, and 165** Hz intermodulation products shall not exceed **10** percent of the **15** Hz component. No individual harmonics shall exceed **10** percent of the **15** Hz component.

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3.2.1.11.3 Pulse Amplitude. The amplitude shall be continuously adjustable over the range of **10** volts to **20** volts peak to peak. The amplitude of the negative half cycle excursion shall be within **10%** of the amplitude of the positive half cycle excursion. The amplitude shall be measured at the output connector with a load connected (see **3.2.1.111.5**).

The amplitude of the pulse stream shall not vary by more than **5%** of total pulse amplitude from the smallest to the largest pulse. In no case shall the peak value of extraneous voltages exceed **0.20** volts peak to peak as measured at the output terminals and connected to a load.

3.2.1.11.4 Pulse Timing. The time reference of the pulse shall be established at the zero crossover point from the positive half cycle excursion to the negative half cycle excursion.

to indicate ~~000.00~~ when the magnetic north information being radiated by the antenna is oriented physically to magnetic north. A visual reading of the control setting shall be provided in increments of ~~0.1~~ ~~20.05~~ degree for ~~± 10~~ degrees each side of the zero degree setting. This rotation for magnetic north alignment shall not disturb the position of the north reference triggers relative to the auxiliary reference triggers. The antenna azimuth shall be adjustable from the antenna control equipment located in the **VORTAC** building. Additionally, the phase relationships of the **15** Hz modulation envelope, relative to the **135** Hz modulation shall not be disturbed during this adjustment.

3.2.1.14 Input Power. Power requirements shall be in accordance with **FAA-G-2100**, paragraph, "Electrical" and all related subparagraphs and as specified herein.

3.2.1.14.1 AC Power. The antenna system shall operate from **120 VAC (RMS)**, **60** Hz, single phase power as the primary power source. The system shall be capable of operation in ~~the presence~~ of severe power fluctuations and transients without sustaining internal damage. The antenna system shall be capable of full **TACAN** operation during complete loss of the **120 VAC** commercial power. The transition to the **FA-9996** standby power battery system shall occur without an interruption of service to the user.

3.2.1.14.2 DC Power. The **TACAN** antenna system shall be capable of operation from the battery power source, Government furnished during periods of commercial power interruptions. This source will vary over a range of **33** to **45** volts, DC, under operational conditions.

3.2.1.14.3 Power Consumption. The total power consumption by the complete **TACAN** antenna system shall not exceed **300** watts.

3.2.1.15 Reserved.

3.2.1.16 Reserved.

3.2.1.17 RF Power Capacity. The antenna system shall be capable of handling beacon peak power outputs between **200** and **5,000** watts, with pulse characteristics as specified in ~~MIL-STD-291~~.

3.2.1.18 Impedance and Voltage Standing Wave Ratio (VSWR). The impedance of the antenna shall be **50 +2.0** ohms (nominal) throughout the frequency band specified herein, and ~~the VSWR~~ shall be no greater than **1.8:1**.

3.2.1.19 DME Mode. The antenna system shall be capable of operating in a **DME** only mode. When the system is in **DME** only operation, the antenna amplitude modulation pattern and **TACAN** reference burst pulses are no longer transmitted.

3.2.1.20 Built-In Monitoring. The azimuth accuracy and percent modulation functions of the antenna group shall be monitored by means of built in devices that will declare an error.

(a) The absolute error of the radiated azimuth information exceeds ~~±10.0~~ degrees or ~~±2.0~~ degrees for the 15 Hz and 135 Hz respectively.

(b) The percent of modulation of the 15 Hz and 135 Hz components measured separately, reduces below 10 percent or exceeds 30 percent.

(c) The total percent modulation, sum of the 15 Hz and 135 Hz components exceeds 50%.

3.2.1.21 Alarm Reporting Formats. For an error lasting six seconds or more, an alarm signal shall be generated to visual fault indicators at the facility and to the TACAN interface as shown in Figure 1 (see paragraph 3.2.2.7)). The alarm fault signal shall remain until the alarm condition clears, or a reset is performed externally.

A reset line shall be provided to the interface by which the antenna system can be reset either locally or remotely thru the operators terminal.

3.2.1.22 Distance Only Operation. Upon detection of an alarm (paragraph 3.2.1.21) by the built in antenna system monitor the reference triggers and antenna modulation shall be removed and a signal sent to the TACAN interface which will initiate reconfiguration of the FA-9996 TACAN system to the distance measuring equipment (DME) only mode of operation.

3.2.1.23 Built-In Test (BIT). A built in test capability shall be provided to test and evaluate the performance of the LRU's of the TACAN antenna system. Provisions shall be made to permit the operator to stop the test cycle at any time during the test sequence. Operation of the built in test devices shall not cause any deterioration of the radiated antenna signals. A test plan for performing the BIT shall be submitted by the contractor, for FAA approval, prior to the construction of the BIT.

3.2.1.23.11 BIT Results. Outcomes will be via visual indicators or signals viewable by an oscilloscope or voltmeter. There will be no requirements for remote operation of the BIT tests. The BIT feature will provide a means of fault isolation and analysis.

3.2.1.24 Warmup Time. The time required for the antenna system to fully operate after being turned on from a cold start shall be no greater than 45 seconds.

3.2.1.25 Electromagnetic Compatibility (EMC). The antenna group shall meet EMC requirements of **FAA-G-2100 "Electromagnetic Compatibility"**.

3.2.2 Physical Characteristics. The antenna system will be the replacement of the present **TACAN** antenna and associated speed control unit. Installation of the antenna or any other **subassembly of the** antenna system shall not impose any structural hazard or risk of injury to the installing or servicing personnel. The antenna system shall be compatible with the present **FA-9996** system and antenna structure.

3.2.2.1. Protective Coating. The antenna shall be painted with a special **radome** paint so as to not distort the radiated pattern. The paint will be white; **Devron** formula **219** in accordance with **MIL-A-29505** or an equal epoxy/polyester hybrid.

3.2.2.2 Size. The antenna size shall be no greater than five **(5)** feet in ~~diameter and~~ ten **(10)** feet in height. Any electronics not located within the antenna shall be suitable for mounting in one standard **19 x 72** inch rack. Dimensions of the rack mounted equipment shall not exceed **20x19x16** inches.

3.2.2.3 Weight. The total weight of the antenna shall not exceed **1,000** pounds.

3.2.2.4 Antenna Mounting. The antenna base shall provide for mounting on a steel support ring as specified in Figure **2**. Bolt holes shall be **1/2" ± 0.005** in diameter. The antenna base shall be marked with a north and south orientation mark on an external surface near the bolting circle.

3.2.2.5 Modular Construction. The **TACAN** antenna system shall use modular construction throughout. Repairs will be made by the replacement of a line replaceable unit **(LRU)**. No **LRU** shall weigh more than **50** pounds.

3.2.2.6 Interconnecting Cabling. No cables or connectors, excluding the ground cable, shall be exposed to the elements. All connections to the antenna shall be via a connector or a internal barrier strip at **the base** of the antenna. All connectors and barrier strip shall be recessed or otherwise located such that no damage shall occur when the antenna is placed on a flat surface. A grounding lug shall be provided near the bottom center of the antenna mounting base.

The radio frequency connector from the **FA-9996 TACAN** equipment shall connect to the antenna connector located along the center bottom of the antenna.

3.2.2.7 Electrical Interface with FA-9996 TACAN. The signals that shall interface the antenna system to the **FA-9996 TACAN** are

3.2.1.25 Electromagnetic Compatibility (EMC). The antenna group shall meet EMC requirements of **FAA-G-2100 "Electromagnetic Compatibility"**.

3.2.2 Physical Characteristics. The antenna system will be the replacement of the present **TACAN** antenna and associated speed control unit. Installation of the antenna or any other subassembly of the antenna system shall not impose any structural hazard or risk of injury to the installing or servicing personnel. The antenna system shall be compatible with the present **FA-9996** system and antenna structure.

3.2.2.1. Protective Coating. The antenna shall be painted with a special **radome** paint so as to not distort the radiated pattern. The paint will be white; **Devron** formula **219** in accordance with **MIL-A-29505** or an equal epoxy/polyester hybrid.

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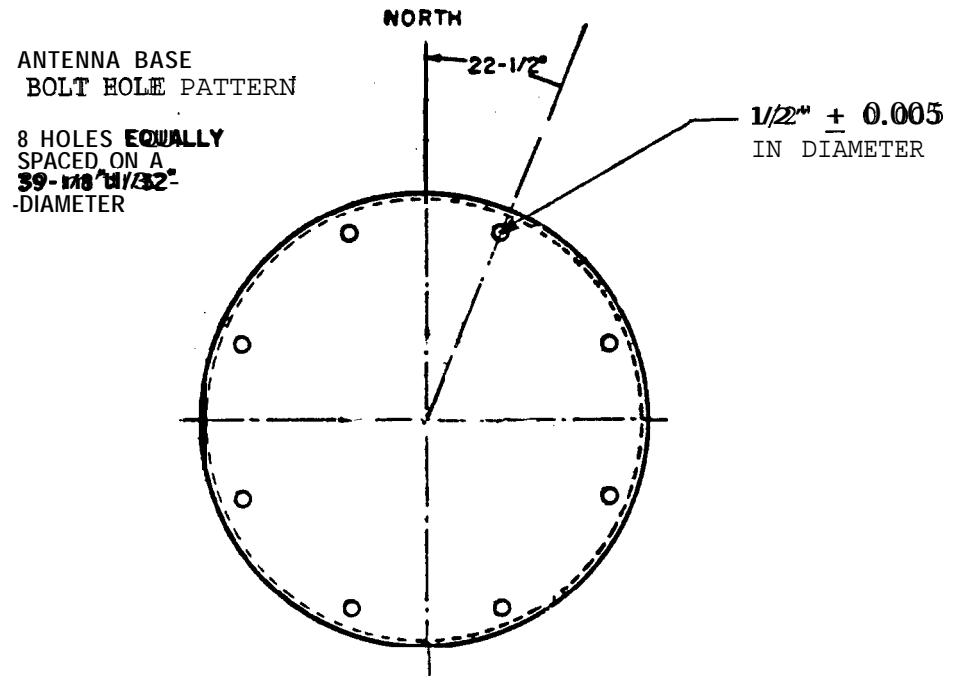


Figure 2. Antenna Base BOLT HOLE PATTERN

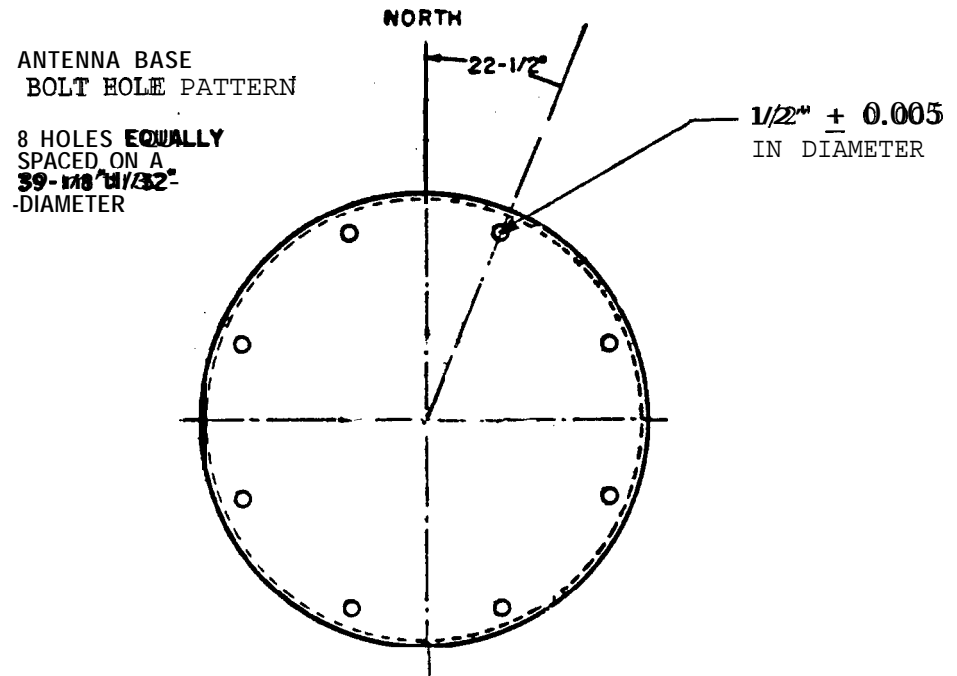


Figure 2. Antenna Base BOLT HOLE PATTERN

30 minutes for each 5,000 hours of equipment operation. Preventive maintenance shall be conducted no more frequently than once every 2190 hours of operation. The mean-bench-repair-time (MBRT) shall not exceed two hours. MBRT is defined as the total bench repair time of the Tacan antenna system LRUs (previously removed) including set up and test time, divided by the number of LRUs repaired.

3.2.4.11 Maintainability Program.— The required maintainability shall be achieved through a maintainability program performed in accordance with MIL-STD-472 and MIL-STD-470. The terms and definitions for maintainability not otherwise described or delineated herein shall be in accordance with MIL-STD-721. All equipment shall be designed and fabricated in a manner that will minimize skill, experience, and time necessary to perform any type of maintenance task. Corrective maintenance shall utilize a remove-and-replace concept with actual repair of the replaced LRU to be accomplished later in a separate maintenance area.

(a) The maintainability program shall include at least two design reviews covering the electrical and mechanical aspects with regard to the accessibility of parts and assemblies for replacement and maintenance operations. The initial design review shall cover the contractor proposed design; the second or final design review shall incorporate all agreed-to changes covered in previous review(s). Interim design reviews may be scheduled as mutually agreed to. Minutes and all relevant data from these reviews shall be documented by the contractor and submitted to the Contracting Officer for approval.

3.2.5 Environmental.

3.2.5.1 Operating Temperature Range. The antenna system shall meet the requirements specified herein and in FAA-G-2100 when its units are exposed to the following temperature ranges:

a. Items exposed to the elements: -50°C to +70 °C (FAA-G-2100 ENV. III)

b. Items inside the building: -10°C to +50°C (FAA-G-2100 ENV II)

3.2.5.2 Non-operating Temperature Range. The antenna system shall not be damaged nor shall performance be degraded when restored to the operating temperature range after being subjected to a non-operating temperature range of -50°C to +70°C.

3.2.5.3 Rain. The antenna system shall operate under blowing rain conditions and shall be capable of withstanding, without damage or performance degradation, rain tests conducted in accordance with method 506.2, procedure 1, of MIL-STD-883C.

3.2.5.4 Altitude. The antenna system shall maintain the performance specified herein, when operated at altitudes up to **10,000** feet and shall be capable of withstanding, without damage, a non-operating altitude of **50,000** feet.

3.2.5.5 Wind Velocity and Icing. The antenna system shall conform to the wind velocity and icing requirement specified in **MIL-E-16400**.

3.2.5.6 Vibration. The antenna system shall be capable of withstanding Method 514, procedure I vibration test of **MIL-STD-810**.

3.2.5.7 Humidity. The antenna system shall conform to the humidity requirement of **FAA-G-2100**.

3.2.5.8 Fine Sand (Dust). The antenna system shall be capable of withstanding the dust (fine sand) test specified in method **510.2** procedure I of **MIL-STD-810**.

3.2.5.9 Reserved.

3.2.5.10 Noise. The application of fans, blowers or other cooling system components shall be such as to minimize noise and vibration to the maximum extent practicable. The sound pressure level produced by operation of the entire ground station equipment, with any number of access doors or drawers open, shall not in any octave band exceed the level shown.

Octave mid frequency in cps	-63	124	250	500	1000	2000	4000	8000
Sound pressure level in db								
referenced to 0.0002 microbars	102	95	91	87	85	82	80	79

Measurement of the sound pressure levels shall be made at a radius of not more than two (2) feet from all parts of the equipment using sound survey instruments. The background noise level of the environment in which measurements are made shall not exceed **75 db** relative to **0.0002** microbars.

3.2.5.11 Lightning Protection.- The antenna and electronic equipment shall be provided with devices that protect against atmospheric electricity and transients from nearby lightning strikes in accordance with **FAA-STD-019** lightning protection and **FAA-STD-020** transients protection. The devices shall be located for convenient replacement. (The primary concern in this regard is to provide maximum protection of the electronic equipment from atmospheric disturbances).

3.2.6 Reserved.

3.3 Design and Construction.— The equipment shall be designed to meet the requirements of **FAA-G-2100** and as specified herein.

3.3.1 Materials. The materials used for the **TACAN** antenna system shall be in accordance with **MIL-STD-108**. The antenna enclosure (**radome**) shall be of such material that it shall neither derogate nor interfere with the navigational signal energy.

3.3.1.1 Toxic Products. Toxic products and formulations shall be avoided to the maximum extent possible. Prior Government approval must be given on an individual case-by-case basis for any toxic materials usage.

3.3.2 Electromagnetic Radiation. Electromagnetic compatibility shall meet the requirements as specified in paragraph **3.2.1.25** of this document.

3.3.3 Nameplate. Nameplates shall be furnished with (attached to) each antenna system unit in accordance with **FAA-G-2100**, "**Nameplates**".

3.3.4 Workmanship. Workmanship on all equipment shall be in accordance with **MIL-E-16400**.

3.3.5 Interchangeability. Interchangeability shall be in accordance with **FAA-G-2100**.

3.3.6 Safety. The antenna system design shall be such that its safety features provide for the protection of personnel during the installation, operation, maintenance or repair of the antenna system or any component thereof.

3.3.7 Human Engineering. Human engineering requirements shall be in accordance with **MIL-H-46855**.

3.3.8 Reserved.

3.3.9 Maintenance Access.— The antenna shall be equipped with doors or panels for easy access to its essential parts. When panels are fully removed for maintenance purposes then the doors/panels shall possess a safety chain to hold them to the antenna structure. If the doors/panels are not fully removed for maintenance/inspection of the antenna, then they shall be provided with a device that will keep them open. The fasteners used to secure the access panels or doors shall be captive and not subject to falling or loss when maintenance is performed. In addition the doors/panels will meet the following requirements:

(a) The removal of the doors or panels shall not compromise the structural integrity of the antenna assembly.

(b) The hinges/fasteners used to secure the doors or panels shall not be subject to rust or corrosion.

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(a) The removal of the doors or panels shall not compromise the structural integrity of the antenna assembly.

(b) The hinges/fasteners used to secure the doors or panels shall not be subject to rust or corrosion.

contract. The submission shall include a description of how the contractor proposes to accomplish configuration management in accordance with **FAA-STD-021** for all deliverable equipment, firmware, software, spare and repair parts and documentation throughout the contract.

3.5.2 Configuration Management Plan.- The contractor shall prepare a Configuration Management Plan as outlined in **FAA-STD-021**. The plan shall describe how the contractor intends to assure proper configuration identification and control auditing and accounting. The plan shall reflect both hardware and software plans. The contractor shall be responsible for its implementation and application to subcontractors, vendors, and suppliers.

3.5.3 Configuration Control.- The contractor shall establish and maintain a configuration management program in accordance with **FAA-STD-021** to insure positive control of the **TACAN** antenna and supporting equipment throughout the life of the contract. This program shall provide for the orderly development and documentation of the details of the configuration of both the hardware and software during the design, development, and production phases. The program shall result in an accurate system definition at the completion of design, all required tests, and acceptance of the first articles by the Government. Upon acceptance of the first articles, the equipment configuration, including the appropriate descriptive documentation, shall be baselined. Thereafter, the contractor shall submit any engineering change proposal which affects baselined hardware, software, or documentation (e.g., instruction books, installation drawing, etc.) to the Government for approval in accordance with FAA Order **1800.8E**.

3.5.4 Configuration Audits.-

3.5.4.1 Functional Configuration Audits (FCA).- The contractor and the Government shall conduct an **FCA** on the first articles of each configuration item in accordance with **FAA-STD-021** after completion of specification compliance testing. The contractor shall be responsible for the support of the audit in accordance with **MIL-STD-1521**, Appendix **G**. The contractor shall prepare and submit agenda and minutes of the **FCA** to the contracting officer as specified in the contract.

3.5.4.2 Physical Configuration Audits (PCA).- The contractor and the Government shall conduct a **PCA** on the first article of each hardware and software configuration item in accordance with **FAA-STD-021**. The contractor shall be responsible for support of the audit in accordance with **MIL-STD-1521**, Appendix **H**. Successful completion of the **PCA** establishes the product baseline. In the event that the **PCA** identifies incorrect engineering or technical data, the contractor shall correct the data to conform to the product baseline at no expense to the Government. The contractor shall prepare and submit agenda and minutes of the **PCA** to the contracting officer as specified in the contract.

3.5.4.3 Configuration Status Accounting. Configuration status accounting shall be in accordance with the approved configuration management plan. The contractor shall comply with the requirements of **FAA-STD-021** for reporting the accomplishment of updating retrofit changes to equipment and software. These items shall be delivered to the contracting officer as specified in the contract.

3.6 Precedence. Policy as established by paragraph **2.1** of this document shall apply. Any actual or apparent conflict, deviation, ambiguity, or change with respect to this document shall be immediately brought to the attention of the FAA Contracting Officer.

4. QUALITY ASSURANCE PROVISIONS

4.1 General. The contractor shall provide and maintain a quality control program in accordance with **FAA-STD-016**, and the quality assurance provisions specified in **FAA-G-2100** shall apply. All test plans shall comply with **FAA-STD-024**. All quality assurance operations performed by the contractor will be subject to Government verification at any time. Verification will consist of, but is not limited to:

(a) Surveillance of the operations to determine that the practices, methods, and procedures of the written quality program are being properly applied.

(b) Government product inspection to measure quality of the product to be offered for acceptance.

(c) Government inspection of delivered products to assure compliance with all inspection requirements of this specification. Failure of the contractor to promptly correct deficiencies discovered by him or of which he is notified shall be cause for suspension of acceptance until corrective action has been taken or until conformance of the product to prescribed criteria have been demonstrated.

4.1.1 Responsibility for Test/Inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all test/inspection requirements as specified herein. Except as otherwise specified in the contract, the contractor may use his own or any other facilities suitable for the performance of the test/inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the tests/inspections set forth in the specification wherein such tests/inspections are deemed necessary to assure supplies and services conform to the prescribed requirements.

4.1.2 Classification of Tests/Inspections. The tests/inspection requirements specified herein are classified as follows:

- a. ~~Preproduction~~ test/inspection (**4.1.2.1**)
- b. Production acceptance test/inspection (**4.1.2.2**)
- c. Periodic production test/inspection (**4.1.2.3**)
- d. Maintainability demonstration test (**4.3**)
- e. Reliability testing (**4.4**)
- f. Inspection of preparation for delivery (**5.0**)
- g. Quality conformance inspection (**4.2**)

4.1.2.1 ~~PreProduction~~ Test/Inspection. ~~Preproduction~~ (first article) test/inspection shall be performed by the contractor after the award of contract and prior to production, at a location acceptable to the Government. ~~Preproduction~~ test/inspection shall be performed as listed in Table **4.1** of this document, on one sample unit which has been produced with equipment and procedure normally used in production.

4.1.2.2 Production Acceptance Test/Inspection. A production acceptance test/inspection shall be made on every equipment offered for delivery. The test/inspection shall be comprised of examinations and testing that will prove the workmanship and reveal the omissions and errors of the production process, such as functional and performance tests at a limited number of points. Tests which reveal deviations from design, defects of materials and tests of adjustment procedures shall be performed. Production acceptance test/inspection items shall include those tests listed in table **4.1** and paragraphs **4.2.1.111** and **4.2.1.112..**

4.1.2.3 Periodic Production Test/Inspection. Periodic production tests/inspections (production control inspection) shall include the periodic production tests listed in table **4.1** and shall be performed on one sample ~~equipment~~ out of every eight equipments produced.

4.1.3 Sampling for Environmental Inspection Items. The environmental type tests are as specified herein and in Table **4.1** of this document. One equipment shall be selected from each successive **40** equipments produced. The first sample equipment shall be selected from the first months production.

4.1.3.1 Nonconforming Environmental Sample Units. If a sample unit fails the environmental inspection, the contractor shall immediately investigate the cause of failure and shall report to the quality assurance representative the results thereof and details of the corrective action taken to correct the production units which were manufactured under the same conditions with the same materials and processes. If the quality assurance representative does not concur that the corrective action will enable the product to conform to specified requirements, or if the contractor cannot determine the cause of failure, then the matter shall be referred to the contracting officer.

TABLE 4.1

TACAN ANTENNA SYSTEM VERIFICATION REQUIREMENTS TRACEABILITY MATRIX

REQUIREMENTS		TEST LEVEL AND METHOD				TEST LOCATION		CROSS REFERENCE	REMARKS
PARAGRAPH NUMBER	TITLE	(FIRST ARTICLE) PRE-PRODUCTION	PRODUCTION ACCEPTANCE	PERIODIC PRODUCTION	OPERATIONAL SHAKEDOWN	FA	APM-150	PARAGRAPH	
.2.1	PERFORMANCE CHARACTERISTICS	D	-	-	D	X	X	.2.1.4., TABLE 4.2	
.2.1.1	BAND OF OPERATION	T	T	-	-	X			
.2.1.2	POLARIZATION	T	T	-	T	X	X		
.2.1.3	SERVICE AREA	T		-	T	X	X		
.2.1.4	ANTENNA GAIN	A, T	T	-	-	X			
.2.1.5	HORIZONTAL FIELD	A, T		-	-	X			
	PATTERN								
.2.1.6.	VERTICAL FIELD								
	PATTERN								
.2.1.6.1	MAIN LOBE	A, T	T	-	-	X			
.2.1.6.2	SILOPE	A, T	T	-	-	X			
.2.1.6.3	POWER GAIN	A, T	T	-	-	X			
.2.1.6.4	POWER GAIN BELOW THE HORIZON	A, T	T	-	-	X			
.2.1.6.5	POWER GAIN ABOVE THE HORIZON	A, T	T	-	-	X			
.2.1.7	AZIMUTH	T	T	-	T	X	X		
.2.1.8	AZIMUTH VARIABLE SIGNAL	T	T	-	T	X	X		
.2.1.9	MODULATION	A, T	T	-	-	X			
.2.1.10	HARMONIC CONTENT	T	T	-	T	X	X		
.2.1.11	REFERENCE BEARING SIGNALS	T	T	-	-	X			
.2.1.11.1	PULSE SHAPE	T	T	-	T	X	X		
.2.1.11.2	PULSE WIDTH	T	T	-	T	X	X		
.2.1.11.3	PULSE AMPLITUDE	T	T	-	T	X	X		
.2.1.11.4	PULSE TIMING	T	T	-	T	X	X		
VERIFICATION METHODS: INSPECTION=I, ANALYSIS=A, TEST=T, DEMONSTRATION=D, NOT APPLICABLE=-									

CONTINUED

TABLE 4.1

TACAN ANTENNA SYSTEM VERIFICATION REQUIREMENTS TRACEABILITY MATRIX

REQUIREMENTS		TEST LEVEL AND METHOD				TEST LOCATION	CROSS REFERENCE	REMARKS
PARAGRAPH NUMBER	TITLE	(FIRST ARTICLE) PRE-PRODUCTION	PRODUCTION ACCEPTANCE	PERIODIC PRODUCTION	OPERATIONAL SHAKEDOWN	FA	APM-150	PARAGRAPH
.%.I	PERFORMANCE CHARACTERISTICS	D	=	-	D	X	X	.2.1.4,, TABLE 4.2
.2.1.1	MODE OF OPERATION	T	T	-		X		
.2.1.2	POLARIZATION	T	T	-	T	X	X	
.2.1.3	SERVICE AREA	T		-	T	X	X	
.2.1.4	ANTENNA GAIN	A,T	T	-		X		
.2.1.5	HORIZONTAL FIELD	A,T		-		X		
.2.1.6.	PATTERN							
.2.1.6.1	VERTICAL FIELD							
.2.1.6.2	PATTERN							
.2.1.6.3	MAIN LOBE	A,T	T	-		X		
.2.1.6.4	SCOPE	A,T	T	-		X		
.2.1.6.5	POWER GAIN	A,T	T	-		X		
.2.1.6.6	POWER GAIN BELOW THE HORIZON	A,T	T	-		X		
.2.1.6.7	POWER GAIN ABOVE THE HORIZON	A,T	T	-		X		
.2.1.8	AZIMUTH	T	T	-	T	X	X	
.2.1.9	AZIMUTH VARIABLE SIGNAL	T	T	-	T	X	X	
.2.1.10	MODULATION	A,T	T	-		X		
.2.1.11	HARMONIC CONTENT	T	T	-	T	X	X	
.2.1.11.1	REFERENCE BEARING SIGNALS	T	T	-		X		
.2.1.11.1.1	PULSE SHAPE	T	T	-	T	X	X	
.2.1.11.1.2	PULSE WIDTH	T	T	-	T	X	X	
.2.1.11.1.3	PULSE AMPLITUDE	T	T	-	T	X	X	
.2.1.11.1.4	PULSE TIMING	T	T	-	T	X	X	
VERIFICATION METHODS:		INSPECTION	I	AN	YS	=A,	TEST=T,, DEMONSTRATION=D, NOT APPLICABLE=-	
CONTINUED								

CONTINUED

TABLE 4.1
TACAN ANTENNA SYSTEM-VERIFICATION REQUIREMENTS TRACEABILITY MATRIX

REQUIREMENTS		TEST LEVEL AND METHOD				TEST LOCATION		CROSS REFERENCE	REMARKS
PARAGRAPH NUMBER	TITLE	(FIRST ARTICLE) PRE-PRODUCTION	PRODUCTION ACCEPTANCE	PERIODIC PRODUCTION	OPERATIONAL SHUTDOWN	FA	APM-150	PARAGRAPH	
3.2.2.3	WEIGHT	D	-	-	-	X			
3.2.2.4	ANTENNA MOUNTING	D	-	-	-	X			
3.2.2.7.5	MODULAR CONSTRUCTION	D	-	-	D	X	X		
3.2.2.6	INTERCONNECTING CABLE	D	I	-	I	X	X		
3.2.2.7	ELECTRICAL INTERFACE WITH FA9996 TACAN								TITLE
3.2.2.7.1.1	REFERENCE AND IDENTIFICATION SIGNALS	T	-	-	T	X	X		
3.2.2.7.2.2	TACAN SHUTDOWN SIGNALS	T	-	-	T	X	X		
3.2.2.7.3	MAINTENANCE ALERT SIGNAL	T	D	-	T	X	X		
3.2.2.7.4	ANTENNA RESET	T	D	-	T	X	X		
3.2.2.7.5	DISTANCE INFORMATION ONLY MODE	T	D	-	T	X	X		
3.2.2.7.6	ANTENNA RF POWER CONNECTOR	D	-	-	I	X	X		
3.2.2.8	LEAKAGE CURRENT	T	-	T	T	X	X	4.2.1.3	
3.2.2.9	CONVENIENCE OUTLETS	T	I	-	I	X	X		
3.2.2.10	MICROELECTRONIC DEVICES	I	I	-	I	X	X		
3.2.2.11.1	SPECIAL TOOLS	D	-	-	I	X	X		
3.2.3.1	RELIABILITY PROGRAM	D	-	-	D	X	X	4.4 to 4.4.2	
3.2.4	MAINTAINABILITY	D	-	-	D	X	X	4.3 and 4.3.1	
3.2.4.1	MAINTAINABILITY PROGRAM	D	-	-	-	X			
VERIFICATION METHODS: 1 INSPECTION=I, ANALYSIS=A, TEST-T, DEMONSTRATION=D, NOT APPLICABLE=-									

CONTINUED

TABLE 4.1
TACAN ANTENNA SYSTEM-VERIFICATION REQUIREMENTS TRACEABILITY MATRIX

REQUIREMENTS		TEST LEVEL AND METHOD		TEST LOCATION	CROSS REFERENCE	REMARKS			
PARAGRAPH NUMBER	TITLE	(FIRST ARTICLE) PRE-PRODUCTION	PRODUCTION ACCEPTANCE	PERIODIC PRODUCTION	OPERATIONAL CHANGEOVER	FA	APM-150	PARAGRAPH	TITLE
3.2.5	ENVIRONMENTAL								TITLE
3.2.5.1	OPERATING TEMPERATURE RANGE	T	-	F	-	X		4.2.1.1, 4.1.3 TO 4.1.3.3	
3.2.5.2	NON-OPERATING TEMPERATURE RANGE	T	-	F	-	X		4.2.1.6	
3.2.5.3	RAIN	T	-	-	-	X		4.2.1.6	
3.2.5.4	ALTITUDE	T	-	-	-	X		4.2.1.7	
3.2.5.5	WIND VELOCITY AND ICING	T	-	F	-	X		4.2.1.8, 4.1.3 TO 4.1.3.3	
3.2.5.6	VIBRATION	T	-	-	-	X		4.2.1.9, 4.1.3 TO 4.1.3.3	Shock test performed as per 4.2.1.10
3.2.5.7	HUMIDITY	T	-	F	-	X		4.2.1.2, 4.1.3 TO 4.1.3.3	
3.2.5.8	FINE SAND (DUST)	T	-	F	-	X		4.2.1.15, 4.1.3 TO 4.1.3.3	
3.2.5.10	NOISE	T	-	-	-	X			
3.2.5.11	LIGHTNING PROTECTION	D	-	-	-	X			
3.3.	DESIGN AND CONSTRUCTION	-	-	-	-				TITLE
3.3.1	MATERIALS	T	-	-	-	X			
3.3.1.1	TOXIC PRODUCTS	T	-	-	-	X			
3.3.2	ELECTROMAGNETIC RADIATION	T	-	F	-	X		4.2.1.13, 4.1.3 TO 4.1.3.3	
3.3.3	NAMEPLATE	-	F	-	-	X			
VERIFICATION METHODS: INSPECTION=I, ANALYSIS=A, TEST=T, DEMONSTRATION=D, NOT APPLICABLE=-									

TABLE 4.1
TACAN ANTENNA SYSTEM-VERIFICATION REQUIREMENTS TRACEABILITY MATRIX

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REQUIREMENTS	TEST LEVEL AND METHOD	TEST LOCATION	CROSS REFERENCE	REMARKS					
PARAGRAPH NUMBER	TITLE	(FIRST ARTICLE) PRE-PRODUCTION	PRODUCTION ACCEPTANCE	PERIODIC PRODUCTION	OPERATIONAL UNKNOWN	FA	APM-150	PARAGRAPH	TITLE
3.2.5	ENVIRONMENTAL	T	-	F	-	X			TITLE
3.2.5.1	OPERATING TEMPERATURE RANGE	T	-	F	-	X		4.2.1.1, 4.1.3 TO 4.1.3.3	
3.2.5.2	NON-OPERATING TEMPERATURE RANGE	T	-	F	-	X		4.2.1.6	
3.2.5.3	RAIN	T	-	-	-	X		4.2.1.6	
3.2.5.4	ALTITUDE	T	-	-	-	X		4.2.1.7	
3.2.5.5	WIND VELOCITY AND ICING	T	-	F	-	X		4.2.1.8, 4.1.3 TO 4.1.3.3	
3.2.5.6	VIBRATION	T	-	-	-	X		4.2.1.9, 4.1.3 TO 4.1.3.3	Shock test performed as per 4.2.1.10
3.2.5.7	HUMIDITY	T	-	F	-	X		4.2.1.2, 4.1.3 TO 4.1.3.3	
3.2.5.8	FINE SAND (DUST)	T	-	F	-	X		4.2.1.15, 4.1.3 TO 4.1.3.3	
3.2.5.10	NOISE	T	-	-	-	X			
3.2.5.11	LIGHTNING PROTECTION	D	-	-	-	X			
3.3.	DESIGN AND CONSTRUCTION	-	-	-	-				TITLE
3.3.1	MATERIALS	T	-	-	-	X			
3.3.1.1	TOXIC PRODUCTS	T	-	-	-	X			
3.3.2	ELECTROMAGNETIC RADIATION	T	-	F	-	X		4.2.1.13, 4.1.3 TO 4.1.3.3	
3.3.3	NAMEPLATE	-	F	-	-	X			
VERIFICATION METHODS: INSPECTION=I, ANALYSIS=A, TEST=T, DEMONSTRATION=D, NOT APPLICABLE=-									

4.1.3.2 Reinspection of Conforming Environmental Sample Units. Unless otherwise specified in the contract, sample units which have been subjected to environmental tests and have passed, may be accepted on the contract provided they are tested again and pass the production inspection after the repair of **any** damaged components or areas.

4.2 Quality Conformance Inspection.

4.2.1 Test Methods.

4.2.1.1 Temperature Test. The high temperature test shall be performed in accordance with Method ~~501~~ Procedure II, of ~~MIL-STD-810~~. The environmental atmospheric pressure for the test shall be the atmospheric pressure at the test site. The low temperature test shall be performed in accordance with ~~MIL-STD-810~~, Method **502**, Procedure **1**, for all units of the antenna group.

4.2.1.2 Humidity Test. The humidity test shall be performed in accordance with method **507**, procedure I, ~~MIL-STD-810~~ for all units of the antenna group.

4.2.1.3 Leakage Current (Equipment). Leakage current shall be measured in the following manner. The equipment shall be connected directly to an external power source and units deriving power from the equipment shall be placed on an insulated surface. All safety ground conductors between the equipment and units deriving power from the equipment shall be intact. The safety ground conductor between the equipment under test and the power source shall be disconnected. The leakage current shall be measured in terms of voltage. The voltage measured across **1500** ohms of resistance between the two items under test shall not exceed **75** volts at the highest nominal power line voltage for ~~which, the~~ equipment is designed. The input impedance of the voltmeter shall be no less than one ~~megohm~~. The probe shall be connected to the equipment enclosure and measurements taken for every combination of switch positions available in the typical test diagram as shown in Figure **3**.

4.2.1.4 Electrical Design and Construction. The method of measurements for the specified characteristics shall be the test methods specified in ~~MIL-E-16400~~ except that a transient voltage of ~~230~~ percent of nominal voltage shall be used. Tests shall be performed at **60** Hz.

4.2.1.5 Warmup Time. The warm up time shall be measured on the antenna system.

4.2.1.6 Rain Test. A rain test shall be performed in accordance with method **506** of ~~MIL-STD-810~~.

4.2.1.7 Altitude Test. The operating altitude test shall be performed in accordance with method **500** of ~~MIL-STD-810~~. The nonoperating altitude test shall be performed in accordance with Method **500** of ~~MIL-STD-810~~.

4.1.3.2 Reinspection of Conforming Environmental Sample Units. Unless otherwise specified in the contract, sample units which have been subjected to environmental tests and have passed, may be accepted on the contract provided they are tested again and pass the production inspection after the repair of any damaged components or areas.

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4.2.1.4 Electrical Design and Construction. The method of measurements for the specified characteristics shall be the test methods specified in ~~MIL-E-16400~~ except that a transient voltage of ~~230~~ percent of nominal voltage shall be used. Tests shall be performed at **60** Hz.

4.2.1.5 Warmup Time. The warm up time shall be measured on the antenna system.

4.2.1.6 Rain Test. A rain test shall be performed in accordance with method **506** of ~~MIL-STD-810~~.

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4.2.1.8 Wind and Ice Loading. This test shall be accomplished using static loads to determine that transmitted signal paths do not deviate from the allowed performance in accordance with **MIL-E-16400**.

4.2.1.9 Vibration Test. The vibration test for all units of the antenna shall be performed in accordance with method **514**, parts 1 and 2, of **MIL-STD-810**.

4.2.1.10 Shock Test. The shock test will be performed in accordance with Method **516** of **MIL-STD-810**. The antenna shall be in transport configuration and be dropped **601.916** cm (**24** inches).

4.2.1.11 Workmanship. Workmanship on all equipment shall be in accordance with **MIL-E-16400**.

4.2.1.12 Equipment Conditioning (Burn-In) Test. All deliverable hardware **except** first article(s) shall be subjected to equipment conditioning to assure stabilization of the required characteristics of the equipment, elimination of initial failures due to random defective components, and marginal operation due to component lot variations and poor assembly processes or procedures. The following test approach shall be used:

a. The antenna group shall be subjected to **48** hours of continuous operation under conditions of continuous operation within the environmental and power input envelopes specified for operating conditions. No failures shall be permitted during the operation. If failures occur, **48** hours of operation shall be repeated after the necessary repairs have been made. Equipment shall operate for **48** continuous failure free hours before the equipment **conditioning** test is met.

b. A performance check for operation shall be performed twice every **24** hours as a minimum, and ^{just} prior to the end of conditioning.

4.2.1.13 Electromagnetic Compatability. Electromagnetic compatibility shall be verified by tests performed in accordance with **MIL-STD-462**. Only tests **CE03** and **TE03** are required during environmental inspection.

4.2.1.14 Test Frequencies. The tests specified in Table **4.2** shall be performed at the test frequencies shown therein.

4.2.1.15 Dust (Fine Sand). The dust (fine sand) test shall be performed in accordance with Method **510.2**, procedure 1, of **MIL-STD-810**.

4.3 Maintainability Demonstration Test. When required by the contract, the maintainability of this antenna system shall be demonstrated using method 4 of **MIL-STD-4711**. An **MTTR** as defined in para **3.2.4** not greater than **30** minutes shall be demonstrated. An **MBRT**, as defined in para **3.2.4**, not greater than two hours shall be demonstrated for the repair of all **LRUs**.

TABLE 4.2
TEST FREQUENCIES-VERIFICATION REQUIREMENTS TRACEABILITY MATRIX

REQUIREMENTS		TEST FREQUENCIES (MHZ)								TEST LEVEL AND METHOD			TEST LOCATION		CROSS REFERENCE	REMARKS	
PARAGRAPH NUMBER	TITLE	962	993	1024	1056	1087	1118	1150	1182	1213	(FINDS ANOMALY PRE-PRODUCTION)	PRODUCTION ACCEPTANCE	OPERATIONAL SHAKEDOWN	FA	APM-150		
1.2.1.2	POLARIZATION	X		X		X		X		X	T	T	T	X	X	4.2.1.14	TITLE
1.2.1.4	ANTENNA GAIN	X		X		X		X		X	T	T	T	X	X		
1.2.1.6	VERTICAL FIELD PATTERN																
1.2.1.6.1	MAIN LOBE	X		X		X		X		X	T	T	T	X	X	4.2.1.14	
1.2.1.6.2	SLOPE	X		X		X		X		X	T	T	T	X	X		
1.2.1.6.3	POWER GAIN	X		X		X		X		X	T	T	T	X	X		TITLE
1.2.1.6.4	POWER GAIN BELOW THE HORIZON	X		X		X		X		X	T	T	T	X	X		
1.2.1.6.5	POWER GAIN ABOVE THE HORIZON	X		X		X		X		X	T	T	T	X	X		
1.2.1.9	MODULATION	X		X		X		X		X	T	T	T	X	X		
1.2.1.10	HARMONIC CONTENT	X		X		X		X		X	T	T	T	X	X		
1.2.1.12	CRITICAL AZIMUTH																
1.2.1.12	COARSE BEARING	X		X		X		X		X	T	T	T	X	X	1.2.1.14	
1.2.1.12	FINE BEARING	X		X		X		X		X	T	T	T	X	X	1.2.1.14	
1.2.1.18	IMPEDANCE AND VSWR	X	X	X	X	X	X	X	X	X	T	T	T	X	X		

TITLE

TITLE

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REQUIREMENTS		TEST FREQUENCIES (MHZ)								TEST LEVEL AND METHOD			TEST LOCATION		CROSS REFERENCE	REMARKS	
PARAGRAPH NUMBER	TITLE	962	993	1024	1056	1087	9	5	82	33	(FIRST ANALYSIS) PRE-PRODUCTION	PRODUCTION ACCEPTANCE	OPERATIONAL SHAKEDOWN	FA	APM-150		
1.2.1.2	POLARIZATION	X		X		X		X		X	T	T	T	X	X	4.2.1.14	TITLE
1.2.1.4	ANTENNA GAIN	X		X		X		X		X	T	T	T	X	X		
1.2.1.6	VERTICAL FIELD PATTERN																
1.2.1.6.1	MAIN LOBE	X		X		X		X		X	T	T	T	X	X	4.2.1.14	
1.2.1.6.2	SLOPE	X		X		X		X		X	T	T	T	X	X		
1.2.1.6.3	POWER GAIN	X		X		X		X		X	T	T	T	X	X		TITLE
1.2.1.6.4	POWER GAIN BELOW THE HORIZON	X		X		X		X		X	T	T	T	X	X		
1.2.1.6.5	POWER GAIN ABOVE THE HORIZON	X		X		X		X		X	T	T	T	X	X		
1.2.1.9	MODULATION	X		X		X		X		X	T	T	T	X	X		
1.2.1.10	HARMONIC CONTENT	X		X		X		X		X	T	T	T	X	X		
1.2.1.12	CRITICAL AZIMUTH																
1.2.1.12) COARSE BEARING	X		X		X		X		X	T	T	T	X	X	1.2.1.14	
1.2.1.12) FINE BEARING	X		X		X		X		X	T	T	T	X	X	1.2.1.14	
1.2.1.18	IMPEDANCE AND VSWR	X	X	X	X	X	X	X	X	X	T	T	T	X	X		

5.1 Preservation, Packaging, Packing and Marking. Preparation for delivery shall be in accordance with the levels of preservation, packaging, packing, and marking specified in **MIL-E-17555** and as specified in the contract.

6. NOTES.

6.1 Intended Use. The equipment covered by the specification is intended for use as a replacement for existing FAA **TACAN** antennas.

6.2 Ordering Data. Procurement documents shall specify the items as follows:

a. Title, number and date of this specification.

b. Number of **preproduction** articles as specified in section **4.1.2.1** of this document.

c. When reinspected environmental sample units are acceptable on the contract as specified in section **4.1.2.12.1** of this document.

6.3 Preproduction. **Preproduction** testing shall be performed in accordance with table **4.1** of this document. The **preproduction** (first article) article will consist of one unit, and it will be the first production article. The **contracting** officer will include specific instructions in the procurement instruments concerning the arrangements for examinations, test, and approval of the **preproduction** item.

6.4 Figures.- Figure **3** is a typical diagram for leakage current measurement. This figure is furnished only as a matter of information to the Contractor. The Government does not represent or guarantee that conformance thereto will insure that the resulting product will meet specification requirements. **Any** reliance that the contractor places on this figure is wholly at his own risk and shall not relieve him of his contractual obligation to comply with all of the **requirements** of this specification.

7. Appendix and Index. Not applicable.



U.S. Department of Transportation
Federal Aviation Administration
Specification

ANTENNA SYSTEMS, TACAN